Version 2.0

National Airspace System Transition Roadmap

Operational Benefits & Capabilities

ADS-B Surveillance in Non-radar Airspace
Enhanced Airspace Flow Program Increases Efficiency
Increased Capacity at Major Metro Airports
Flight efficiency and reduced emissions with RNAV and RNP precision navigation

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Increases flight efficiency and reduced emissions through:
- Oceanic In-Trail Climb and Descent Upgrades
- Domestic flight deck based spacing and merging
- Expanded use of Optimized Profile Descent
- Flexible Entry Times for Oceanic Tracks
- Improved use of Closely Spaced Parallel Runways

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Increased capacity and flight efficiency through the :
- Extension of the 3 Mile Separation Standard
- Automation Assisted Trajectory Negotiation & Conflict Resolution
- Linking of Arrival, Departure and Surface Flow Management
- Increased Capacity by Providing "radar services" with ADS-B at Secondary Airports
- Maintain Enroute Capacity in Convective Weather
- Dynamic Airspace Management
- Enhanced Mapping and Forecasts Using Aircraft Provided Turbulence and Icing Data

2009 - 2012 Near-Term | 2012 - 2018 Mid-Term | 2018 - 2025 Far-Term

Program Mgmt & Systems Engineering - Enterprise Governance

- NextGen Implementation Plan Developed and Used to Manage the Evolution of the NAS Towards NextGen
- Enterprise Governance Instantiated, Security and Interoperability Standards Developed and Implemented
- Workforce Preparation for NextGen Mid-Term Capabilities
- Workforce Preparation for Far Term NextGen Capabilities
- Development of Safety Risk Management program
- Enterprise Architecture Views and Products Developed and Maintained. Research Efforts Coordinated with the EA, and NAS Architecture Harmonized with International Efforts

Aircraft

- Surface Collision Avoidance
- Equipped aircraft automatically receive airborne broadcast traffic information
- Use aircraft provided short-term intent data for modeling conflict-free flows
- Exchange flight planning information and negotiate flight trajectory contract amendments in near real-time
- Support decision-making by the flight crew and flight operations centers
- Support lower separation minimums
- Enable real-time control instructions
- Support aircraft-to-aircraft delegation of separation authority
- Paired Approach in IMC to Closely Spaced Parallel Runways
- Provide near real-time notification of changing weather situations
- Receive Hazardous Weather Information
- Strategically and tactically use aircraft position and intent reports for more efficient flows

Air-Ground

- Submit A-G Data Integrity Requirements to Automation Mid-Term work package
- Policy - Synchronized A-G Implementation
- Coordinated Operational Approvals for Air-Ground Systems
- Research Transition Integrated A-G Base-lined Concepts
- Policy - Human / Automation-Centric Operations
- Integrated Performance-Based Standards & Guidance
- Research Transition Human / Automation-Centric Operations
- Collaborative Decision Making
- Policy - Integrated Air-Ground Base-Lined Operational Concepts
- Research Transition A-G Safety Network
- Policy - Global A-G Information Exchange Assurance

Automation

- Processing of Automatic Dependent Surveillance (ADS) data Reduces Aircraft Separation Requirements
- Improved Surface Traffic Management Weather Information to optimize throughput
- Integrate Satellite
- Integrated Departure Arrival Capability
- Airborne Re-routes
- Information Display Of Wake Measurements
- Flight Object processing
- Tailored Arrivals & Continuous Descent Approach
- Update SUA/SAA
- Advanced Dynamic Airspace Management
- Pre-departure & Airborne Re-routes
- Aircraft performance awareness
- Automated PIREP's
- Display Wake Independent Runway Status "Green" or "Red" Light
- Monitor Trajectory conformance
- Monitor Taxi conformance
- Provide Sequencing & Staging list
- Monitor Runway Conformance
- Change Sector Boundaries and Airspace Volume definitions
- Conflict Resolution Advisory via Data Communications
- Improved trajectory model for transition airspace
- OTM 4D Pre-Departure
- Process & Display Surface Information
- Provide Remote Tower Operations
- Integrate Wake information into departure and arrival
- Provide Wx reports to handheld devices
- Fully integrate flight and state data
- Apply real-time aircraft wake data
- Fully enhanced conflict probe utilizing turbulence information
- Full integration with ASIAS
- Fully automate sequencing & separation at non-tower airports
- Enhanced procedures & chart storage
- Provide Flight & Status Data
- PBN Route eligibility checking
- Enhanced Congestion Prediction
- Provide PBN separation and alerting
- NAS Status via Digital NOTAM's
- RNP Conformance Monitoring
- Reduced Separation Decision Support
- Integrated Metering
- Provide Dynamic Metering
- Provide Dynamic Metering with Weather Integration
- Provide Multi Sector Planner
- Fully Integrated Dynamic Real Time Feedback based on runway/taxiway changes
- Provide integrated Problem Detection & Resolution Tool
- Integrate EMS processing into Enroute operations
- Pre-departure Re-routes
- Process pre-departure clearances & amendments
- Provide flight specific congestion alerts for impact assessment
- Provide Digital LOA's & SOP's
- Provide Constraint Information & Operational Analysis
- Provide NAS Infrastructure Data
- Display Situational Awareness of Aircraft Equipage for Performance Based Navigation
- Safety Improved & Capacity Enhanced Wake Turbulence Prediction CSPR (Arrivals)

Weather

- Enhanced hi-res (3 km) wind data from NWS
- More Accurate 2-hr Thunderstorm Forecasts
- Probabilistic Convection Forecast for DSTs
- Enhanced Terminal Forecasts
- Additional Terminal Wind Products (Path Based Shear)
- Additional Airborne Wx Data (Turbulence & Humidity) Available
- 4D Wx Cube (NNEW) Supports Net-enabled Wx Information Exchange
- Improved Probabilistic Thunderstorm Forecasts (6-hr available)
- Provide Data at User-defined Spatial and Temporal resolution
- Forecasts of Thunderstorms (8-10 hrs) & Turbulence (6-8 hrs) available
- Wx R&D results in high-res grid
- Access to the 4D (SAS) Single Authoritative Source
- Ground-to-Air Wx Information Data Distribution
- Near real time Distribution Of Improved Wx Information (Turb/Icing/Thunderstorms) To all Users & Service Providers
- Safety Improved & Capacity Enhanced due Wake Turbulence Prediction (Single Runway)
- Consolidate Radar Observing Systems; Optimized Coverage to Meet NextGen Reqm'ts
- Improved Wind Shear Detection/Alerts at Juneau, AK Airport
- NEXRAD S/W Mods Improve In-flight Icing Detection/Forecasts
- Safety Improved & Capacity Enhanced Due Wake Turbulence Prediction for CSPR (Departures)
- PIREP Automation For ATC
- Improved Ceiling/VIS
- Improved Integrated Surface Observations (temporal & spatial resolution)
- Provide De-conflicted Wx picture
- Improved Oceanic Forecasts of Thunderstorms & Volcanic Ash

Communications & Net-Centric Enterprise Services

- Provide revised PDC's
- Terminal Ops Enhanced (Runway Snow Removal/Wing De-icing) w/Improved Sfc Obs
- User DST determines Wx Impact on Decisions
- Provide 1-hour forecast of RVR
- Provide DataCom performance & usage data
- Support Dynamic Resectorization
- Provide CPDLC messaging via Data link to ARTCC & ATCT
- Provide flexible G/G and A/G voice networking to facilitate ATC load sharing and business continuity
- Provide NAS & Aeronautical Information
- Provide CPDLC messaging via Data link to TRACON
- Airport Wireless LAN for non-safety critical communications
- Provide NVS performance data
- Provide DataCom performance data
- Provide FTI performance data
- Provide ADS-C messaging over A/G data link

Navigation

- Improved Approached and Landing Operations in low Visibility conditions (Augmented GNSS, EFVS and SVS capabilities
- Expanded Precision Approach Navigation (Dual Frequency WAAS/LAAS)
- Provide expanded RNAV/RNP coverage via DME
- Increase Availability of Precision Navigation Operations Dual Frequency WAAS/LAAS
- Improved Interference Mitigation Dual Frequency WAAS/LAAS
- Improve Navigation Accuracy for Trajectory Based Operations

Surveillance

- TIS-B to provide Aviation Situational Awareness
- FIS-B to provide Weather & NAS Situational Awareness
- Surveillance Interface Modernization to improve Radar Data Distribution
- Monitor 2500 foot Parallel Runway Separation (1 second update)
- Surveillance Requirements for Big Airspace
- ASR Wx Receiver data to ASR-WSP
- ASR 6-Level Weather Channel data
- Runway status situational awareness
- Automated

Facilities

- NextGen Facilities Phase I
- NextGen Facilities Phase II
- Remotely Staffed Tower Services
- NextGen Facilities Phase III
- NextGen Facilities Phase IV
- Virtual Towers
- NextGen Facilities Phase V

Key Supporting Activities (research, demonstrations, and standards development)

- System Wide Information Management (SWIM)
- Common Status and Structure Data (CSSD)
- Develop and Integrate Human Automation Interfaces
- Interactive Flight Planning and Shared Common Operating Picture
- Multi-Function Phased Array Technology Evaluated for Enhanced Surveillance and Weather Processing Capabilities
- Common Controller Display Development
- Trajectory Modeling for Common Operational Picture
- Harmonize Standards and Performance for FMS, RNP, and RSP
- Separation Enhancement Standards
- NAS Enterprise Security (NextGen) Standards Developed to Enhanced the Integrity of the NAS
- Separation and Trajectory Management Enablers, Taxi Instructions
- Time Based Flow Management / IES / Multi-Sector Planning Tool
- Integration Methods for Real Time Wake Vortex Data into Aircraft 4D Trajectory Management
- Collaborative ATM, Flight & State Management to Improve NAS Efficiency, Safety and Capacity
- High Resolution Weather Modeling
- Data Exchange Performance Standards Development
- Demonstrations: Surface Traffic Management / Time Based Metering / 4D Trajectory Flight Management / Predictive Weather / Optimized Profile Descent
- Research and Procedures Development for Integration of Unmanned Aircraft Systems (UAS) Into the NAS
- Safety Risk Management Document development to perform Safety Risk Assessment

Note: Milestones depict earliest possible IOC